REMARKS

Claim 1 has been amended. Claims 6-10 have been cancelled without prejudice. New claim 11 has been added.

Applicant is submitting with this Amendment a Petition for 2-Months Extension of Time with a payment in the amount of $490.00 for the 2-Month Extension of Time fee by EFT. If any additional fees are required for entry of this Amendment, authorization is granted to charge our deposit account number 03-3415.

The Examiner has rejected applicant's claims 1-10 under 35 USC 103(a) as being unpatentable over the Lin, et al. (U.S. Patent No. 6,069,973) patent in view of the TeWinkle (U.S. Patent No. 7,164,506) patent and the Okisu, et al. (U.S. Patent No. 6,571,022) patent. Applicant has cancelled applicant's claims 6-10, thereby obviating the Examiner's rejection as to these claims. Applicant has amended independent claim 1, and with respect to this claim, as amended, and its respective dependent claims, the Examiner's rejection is respectfully traversed.

In particular, applicant has amended independent claim 1 to recite: an image sensing apparatus comprising: an image sensing element includes a first light receiving area and a second light receiving area which are formed on an image pickup surface of a semiconductor substrate by a plurality of divisional joint exposure operations, wherein the image pickup surface has on-chip color filter layer and on-chip micro lens layer on a semiconductor layer, wherein there is a shift between the on-chip color filter layer and the on-chip micro lens layer of the first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area, and wherein pixel signals obtained by the first light receiving area and the second light receiving area are read out from the image sensing element via a same channel; a correction device which corrects difference between output levels of pixel signals output from the first light

receiving area and the second light receiving area via the same channel, wherein the difference between levels of the signals is a level difference caused by the shift between the on-chip color filter layer and the on-chip micro lens layer of the first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area; and a control device which controls to write a signal corrected by said correction device to a frame memory. Support for the amendments may be found in applicant's specification as filed, for example, on page 4, line 24 – page 5, line 24 and page 11, line 26 – page 12, line 6. No new matter has been introduced.

In accordance with applicant's claimed invention, an image sensor has at least a first and second light receiving areas that are formed on surface of a semiconductor substrate by a plurality of divisional joint exposure operations which cause a shift between on-chip color filter layer and on-chip micro lens layer of the first light receiving area and on-chip color filter layer and on-chip micro lens layer of the second light receiving area. Further, in accordance with applicant's claimed invention, level difference of signals between the first and second light receiving areas that is caused by such a shift is corrected. In this manner, applicant's claimed invention advantageously enables obtaining of a large size sensor, which cannot be manufactured using conventional technology.

The cited art of record does not teach or suggest such features. In particular, the cited Lin, et al., TeWinkle, and Okisu, et al. patents, alone or in combination with one another, do not teach or suggest an image sensing element including a first light receiving area and a second light receiving area formed on an image pickup surface of a semiconductor substrate by a plurality of divisional joint exposure operations, wherein the image pickup surface has on-chip color filter layer and on-chip micro lens layer on a semiconductor layer, wherein there is a shift between the

on-chip color filter layer and the on-chip micro lens layer of the first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area or a correction device which corrects difference between output levels of pixel signals output from the first light receiving area and the second light receiving area, wherein the difference between levels of the signals is a level difference caused by the shift between the on-chip color filter layer and the on-chip micro lens layer of the first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area, as recited in applicant's independent claim 1.

As discussed by applicant in previous responses, Lin, et al. discloses a the multi-chip image sensor in which effective area has been enlarged by joining (bonding) a plurality of sensor chips (3) together to form the single multi-chip image sensor. In Lin, et al., each sensor chip of the multi-chip image sensor is a discrete chip with its own variations caused by non-uniformity in the color filter coating thickness on each chip. (See col. 1, lines 11-57; col. 5, lines 9-11). Lin, et al. discloses correcting for non-uniformity by successively controlling the image sensor to image three different test targets and for generating respective sets of correction factors, wherein the first set corrects for pixel-to-pixel variations between imaging elements of the image sensor, the second set corrects for chip-to-chip variations between chips of the image sensor, and the third set corrects for array-wide variations of the image sensor. (See Abstract, FIG. 4, col. 1, line 58 – col. 2, line 26).

However, Lin, et al. makes no mention that the chips are formed on the surface of the multi-chip image sensor by a plurality of divisional joint exposure operations or that such operations are performed on the multi-chip image sensor after the chips are joined. Rather, in Lin, et al., pre-manufactured chips are merely bonded or otherwise arranged together to form the

multi-chip image sensor. (See e.g., col. 3, lines 62-64). That is, even assuming that, in Lin, et al., exposure operation(s) are used during manufacturing of each particular chip, no such operations, let alone divisional joint exposure operations, are used in Lin, et al. to form the multi-chip array. Thus, Lin, et al. cannot, and does not, teach or suggest an image sensing element including a first light receiving area and a second light receiving area formed on an image pickup surface of a semiconductor substrate by a plurality of divisional joint exposure operations, as recited in applicant's independent claim 1.

Further, because Lin, et al. merely discloses an optical sensor, the effective area of which has been enlarged by joining a plurality of discrete chips together, Lin, et al. cannot teach or suggest that when the first and second light receiving areas are formed on the image pickup surface using the plurality of divisional joint exposure operations, a shift(such as shown in applicant's FIG. 10) is caused between the on-chip color filter layer and the on-chip micro lens layer of the first light receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area of the image sensing element by the performed plurality of divisional joint exposure operations. Such a shift is entirely different from non-uniformity in the color filter coating thickness of chips in Lin, et al., and thus, Lin, et al. cannot, and does not, teach or suggest correcting difference between output levels of pixel signals output from the first light receiving area and the second light receiving area that is caused by the shift between the on-chip color filter layer and the on-chip micro lens layer of the first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area, as further recited in applicant's independent claim 1.

The cited TeWinkle patent also fails to disclose applicant's claimed correction device and image sensing element. More specifically, as discussed in applicant's previous response,

TeWinkle, similar to Lin, et al., discloses an optical sensor in which an effective area is enlarged by joining a plurality of discrete sensor chips (12) mounted on a substrate and butted end-to-end. (See col. 2, lines 65-66). That is, even assuming that in TeWinkle, exposure operation(s) are used during manufacturing of each particular sensor chip, TeWinkle makes no mention of using such operations, let alone of using divisional joint exposure operations, to mount the chips on substrate and/or butt them end-to-end to form the optical sensor. Thus, TeWinkle cannot, and does not, teach or suggest an image sensing element including a first light receiving area and a second light receiving area formed on an image pickup surface of a semiconductor substrate by a plurality of divisional joint exposure operations, as recited in applicant's independent claim 1.

Further, because in TeWinkle the optical sensor is formed by joining a plurality of discrete chips together TeWinkle cannot teach or suggest that when the first and second light receiving areas are formed on the image pickup surface, using the plurality of divisional joint exposure operations, a shift(such as shown in applicant's FIG. 10) is caused between the on-chip color filter layer and the on-chip micro lens layer of the first light receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area of the image sensing element by the performed plurality of divisional joint exposure operations. TeWinkle also makes no mention of correcting for differences between the chips in the optical sensor. Consequently, TeWinkle cannot, and does not, teach or suggest correcting difference between output levels of pixel signals output from the first light receiving area and the second light receiving area that is caused by the shift between the on-chip color filter layer and the on-chip micro lens layer of the first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area, as further recited in applicant's independent claim 1.

The cited Okisu, et al. also fails to disclose applicant's claimed correction device and image sensing element. Rather, as discussed in applicant's previous response, Okisu, et al. is directed to an image processing apparatus that synthesizes a plurality of overlapping partial images into a single image to form an entire image of an object. (See Abstract; col. 1, lines 10-13; col. 2, lines 48-60). In particular, Okisu, et al. discloses obtaining partial images using two different and distant image sensors (12, 13), wherein the light enters the sensors via an optic path separator (11) such that an overlap (W) is created between the partial images obtained by the sensors (12, 13). (See FIGS. 2, 3, 8, 9 and col.6, lines 15-35). That is, in Okisu, et al., the disclosed sensors are physically separated from one another. (See FIGS. 2, 12, and 13). Thus, Okisu, et al. cannot, and does not, teach or suggest a sensor having different light receiving areas, how such areas are formed, or that a shift between areas is generated due to a manufacturing process used to form the areas in the sensor and needs to be corrected.

Accordingly, Okisu, at al. also does not teach or suggest an image sensing element including a first light receiving area and a second light receiving area formed on an image pickup surface of a semiconductor substrate by a plurality of divisional joint exposure operations, wherein the image pickup surface has on-chip color filter layer and on-chip micro lens layer on a semiconductor layer, wherein there is a shift between the on-chip color filter layer and the on-chip micro lens layer of the first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area or a correction device which corrects difference between output levels of pixel signals output from the first light receiving area and the second light receiving area, wherein the difference between levels of the signals is a level difference caused by the shift between the on-chip color filter layer and the on-chip micro lens layer of the

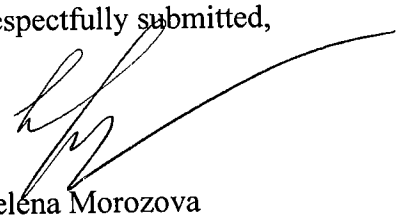
first receiving area and the on-chip color filter layer and the on-chip micro lens layer of the second light receiving area, recited in applicant's independent claim 1.

Since none of the cited Lin, et al., TeWinkle, and Okisu, et al. patents discloses these features, applicant's claim 1, and its respective dependent claims, patentably distinguish over the cited Lin, et al., TeWinkle, and Okisu, et al. patents, whether taken alone or in combination. Thus, it is submitted that applicant's claims under consideration patentably distinguish over the cited art of record. Accordingly, reconsideration of the claims is respectfully requested.

If the Examiner believes that an interview would expedite consideration of this Amendment or of the application to issue, a request is made that the Examiner telephone applicants' undersigned attorney at (212) 790-9225.

Dated: August 10, 2011

Respectfully submitted,



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